

noticed by the three observers to whom we have referred, cannot as yet be adequately interpreted.

Pathological anatomy then helps us a little in our attempts to elucidate hydrophobia. Can we obtain better results by reasoning upon the symptoms and course of the disease from the standpoint of physiology? Hardly, but we may make the attempt. Physiology necessarily cannot help us to understand the nature of the peculiarly subtle poison which can lurk so long in the system without betraying its presence by any symptom, but she may help us in explaining the phenomena which it induces. Of this poison we know as little, if not less, than of the other poisons which are capable of inducing zymotic diseases. Each of those diseases appears to depend upon a definite *materies morbi*, upon the presence of which the peculiar phenomena of each depend; but the periods which elapse between the introduction of the poison and the manifestation of the disease varies in each case, no less than the course and duration of the disease, and the organs and tissues of the body which are affected. Thus, in scarlet fever the poison induces changes in the epithelial surfaces of the body, manifested by the rash, the sore throat, the acute kidney affection; in typhoid fever anatomical changes of the most obvious nature are wrought in the alimentary canal, and lead to the special dangers of the disease; in typhus, again, the poison, whilst producing changes in the general nutrition of the body, and exciting a specially-marked action upon the brain proper (as evidenced by the marked affection of all mental processes), produces no typical anatomical changes. These diseases all illustrate the fact that the poison of each zymotic disease affects certain tissues and organs of the body, and it might be easily shown that it is by the implication of particular functions that each of these poisons usually induces death. Is there, in the case of hydrophobia, any evidence that it affects specially any particular organ of the body? Yes; a physiological analysis of the disease reveals the fact that its symptoms depend upon an affection of the nerve-centres, and especially of the medulla oblongata.

These essential symptoms are—the spasmodic difficulty of breathing, which depends upon a spasm of the *inspiratory* mechanism and a spasmodic affection of the group of muscles engaged in deglutition. The nerve-centres which preside over respiration and the co-ordinated movements of deglutition are situated in the medulla oblongata, and it is these centres which appear to be peculiarly affected. The reflex excitability of this portion of the nervous apparatus becomes first of all heightened so that a stimulus applied to the mucous membrane of the gullet, which in health would give rise to a normal contraction of the muscles of deglutition, travelling on to the morbidly irritable medulla, throws the centre presiding over deglutition into a state of tonic spasm so intense as to be acutely painful; not confining its action to this one centre, the stimulus is able to throw the contiguous respiratory centre into a similar state of spasm, and the patient runs the risk of suffocation because the movements of the thoracic box, which are essential causes of the passage of air into and out of the lungs, cease for a time. The mechanism of suffocation in these cases resembles that observed when the upper end of the pneumogastric nerve is stimulated by a succession of

strong induction shocks, except that in hydrophobia the abnormal effect is doubtless due not to the intensity of the stimulus, but rather to the heightened excitability of the nerve-centres implicated. Apparently a subtle animal-poison acting upon an intensely vulnerable but limited part of the nervous mechanism induces in it an action similar in kind to that produced by strychnia upon the spinal cord. Under the influence of this well-known poison the excitability of the nerve-centres in the cord is heightened, so that a stimulus reaching it by an afferent nerve which would in the healthy unpoisoned condition lead to the reflex and painless contraction of but a small group of muscles, will be able to throw the nerve-cells of the whole cord into intense activity, and as a result occasion the characteristic and terribly painful convulsions of strychnia poisoning. There are, indeed, other facts besides those previously mentioned which point to a state of irritation and increased nervous excitability of the medulla and contiguous nerve-centres. Thus it has been observed that occasionally the pulse has been abnormally slow, a result almost certainly due in these cases to an excitation of the inhibitory centre in the medulla—of that centre which exerts a moderating or restraining influence upon the heart's action; further, it not unfrequently happens that towards the close of the hydrophobic stage, stimuli which were at first only capable of inducing the spasms of deglutition and inspiration, are able to bring on attacks of general convulsions. Here we have a still further extension of the effects of the irritation due to an extension of the reflex excitability from the medulla to the spinal cord.

Our analysis of the symptoms of hydrophobia reveals that as a rule the spasmodic stage terminates before death, which is not produced, as in strychnia poisoning, by the mechanical result of the convulsions—suffocation—but apparently by a more general, though we confess unknown, action of the poison on the organism generally. We know as little of the mode of death in this case as we do in that of scarlet fever, or diphtheria, or typhus, each one of which may produce death without leading to the anatomical results which, at any rate in the case of the two former of these diseases are their usual accompaniments. Zymotic poisons may indeed leave as few traces of their action as the simpler and better known poisons such as prussic acid or morphia, so that whilst we cannot disregard the local manifestations or changes which they induce, and which of themselves are a frequent source of danger, we must admit that they are in many cases—nay in most cases—secondary in importance to the more general phenomena which are the expression of the poisonous influence affecting the organism.

(To be continued.)

ANCIENT HISTORY FROM THE MONUMENTS

Ancient History from the Monuments. The History of Babylonia. By the late George Smith; edited by A. H. Sayce. *The Greek Cities and Islands of Asia Minor.* By W. S. W. Vaux. (Society for Promoting Christian Knowledge, 1877.)

THE Society for Promoting Christian Knowledge has been doing a very useful work in acquainting the public with the historical results of recent Oriental research

in a cheap and handy shape. The work has been wisely placed in the hands of those who have themselves been pioneers in the task of discovery, and the reader has thus been secured against the errors and unfounded conclusions almost inseparable from second-hand information. The histories of Egypt, Assyria, and Persia, have now been followed up by those of Babylonia and Asia Minor, and the fact that the history of Babylonia was the last literary work which Mr. George Smith, the indefatigable Assyrian explorer, lived to accomplish, gives a melancholy interest to it over and above that of its subject matter. Indeed, the materials for reconstructing Babylonian history are still but scanty, and must remain so until systematic excavations can be made among the buried cities and libraries of ancient Chaldea. With the exception of a few early bricks and a few dedicatory inscriptions of Nebuchadnezzar and his successors, it is from the clay tablets of Nineveh that almost all our knowledge of the sister kingdom has been derived. Even Babylonian chronology is still in an uncertain and tentative condition, and the fragments of the Babylonian historian, Berosus, help us but little. Whole periods must still be left blank, and though one or two dates, like the conquest of the Elamite king, Cudur-nankhundi, in B.C. 2280, can be fixed by the aid of later monuments, the relative position of even whole dynasties has not yet been settled. Our acquaintance with the mythical epoch is quite as great as with the historical epoch; the Assyrians preferred the legends of the rival monarchy to a record of its glories, and while, therefore, we now have in detail the stories of the creation, of the flood, or of the hero Izdubar, we know comparatively little of the political changes which passed over the Babylonia of history. Compared, however, with what we knew of them a few years back, even this limited knowledge seems large and accurate, and the best evidence of this is the volume which Mr. Smith has written, and which would have been an impossibility but a short time ago. Those who wish to learn what light has been thrown by cuneiform discovery on this important section of ancient history cannot do better than refer to his book. The importance of Babylonia for the history of culture and civilisation is daily becoming more manifest; the early Accadian population of the country, who spoke an agglutinative language and invented writing, left a rich inheritance of art, science, mythology, and religious ideas to their Semitic successors, and through them to the Jews and Greeks. The latter were influenced partly through the Phœnicians, partly through the nations of Asia Minor. Mr. Vaux's volume on the Greek cities of Asia Minor is therefore a suitable companion to Mr. Smith's "History of Babylonia." His difficulty in compiling it must have been the converse of Mr. Smith's, as here it was not the meagreness but the superabundance of materials which was likely to cause embarrassment. His selection, however, is good and judicious, and the book he has produced is at once instructive and readable. He has not forgotten to invoke the assistance of the latest discoveries; the first few pages are devoted to an account of Dr. Schliemann's life and discoveries, and the researches of Newton, Wood, and Fellows, have been largely drawn upon. Considering the space at his command, Mr. Vaux must be congratulated upon the amount he has been able to

cram into it, and, so far as we can see, no city or fact of importance has been omitted. Both volumes are appropriately illustrated, and the "History of Babylonia" contains a copy of a bronze image of an ancient Chaldean monarch recently brought to the British Museum, and interesting on account of the rarity of such early monuments. Their value is further increased by the addition of indices, and the editor of Mr. Smith's volume has added a chronological table of the Babylonian kings, and an explanatory list of proper names.

FRENCH POPULAR SCIENCE

- Musée Entomologique Illustré. Les Papillons: Organisation, Chasse, Classification.* 80 Plates and 260 Woodcuts. *Les Coléoptères: Organisation, Mœurs, Chasse, Collections, Classification.* 48 Plates and 335 Woodcuts. *Anatomie et Physiologie de l'Abeille.* Par Michael Girdwoyn. 12 Lithographic Plates.
- Les Champignons.* Par F. S. Cordier. 60 Chromolithographs and 8 Woodcuts.
- Les Prairies Artificielles.* Par Ed. Viaune. 127 Woodcuts.
- Les Ravageurs des Forêts et des Arbres d'Alignement.* Par H. De la Blanchère. 162 Woodcuts.
- Les Ravageurs des Vergers et des Vignes; avec une Étude sur le Phylloxera.* Par H. De la Blanchère. 160 Woodcuts.
- Le Chalumeau. Analyses Qualitatives et Quantitatives. Guide Pratique.* Traduction libre du Traité de B. Kerl. Par E. Jannettaz.
- Les Aliments. Détermination Pratique de leurs Falsifications.* Par A. Vogl. Traduction par Ad. Focillon. 160 Woodcuts. (All published by J. Rothschild, Rue des Saints-Pères, Paris.)

WE have received the preceding batch of works from the house of Rothschild of Paris. This is not the first time we have been able to show not only how worthily M. Rothschild is maintaining his position as one of the first publishers of popular science works of the time, but how eagerly such works are read, and how highly they are appreciated in France. It is impossible to speak too highly of the honest work which has been put into each of the volumes, while many of them are written by men whose names are widely known on this side the Channel. As is proper in this style of literature, the text is equalled by the illustrations. Why is it that in the matter of illustrated books such as those before us, the French finished product is so far superior to nine-tenths of those published on this side the water? Nothing can exceed the perfection of many of the hundreds of woodcuts in the above volumes, while we have rarely seen more finished specimens of chromolithography than those to be found in some of the volumes.

We cannot think that the French public is so far beyond our own in its appreciation of science, as to make the publication of similar works in our own country hopeless. We shall therefore give an analysis of each of the above works in a single article, with a view of showing the treatment adopted abroad in popularising the branches of science with which the volumes deal, instead of devoting